UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/679,097	10/04/2000	Tsutomu Yamada	YKI-0058	9653

23413 7590 12/03/2003

CANTOR COLBURN, LLP
55 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

EXAMINER	
JORGENSEN, LELAND R	
ART UNIT	**PAPER NUMBER**
2675	13

DATE MAILED: 12/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/679,097	YAMADA, TSUTOMU	
	Examiner	**Art Unit**	
	Leland R. Jorgensen	2675	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 October 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 2 and 10 – 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ukai, USPN 4,810,060, in view of Tang et al., USPN 5,684,365.

Claim 1

Claim 1 describes a color display device with the size of the driving TFT in a display pixel for one color altered from that in a display pixel for another color. The specification states, "In the present invention, transistor size of a TFT refers to the ratio of the channel width W to the channel length L in the TFT channel, namely, W/L." Specification, page 10, lines 3 – 5. Ukai teaches that the size of the driving TFT in a display pixel for one color is altered from that in a display pixel for another color. Ukai, col. 3, lines 21 – 50.

Ukai does not teach a self-emissive element for emitting light of a predetermined color.

Tang et al. teaches a self-emissive element for emitting light of a predetermined color and a driving thin film transistor (TFT) connected to the self-emissive element for supplying a drive current to the self-emissive element. Tang et al., col. 1, lines 16 – 19; .

It would have been obvious to one of ordinary skill in the art at the time of the invention to use electroluminescence elements as taught by Tang et al. with the display taught by Ukai. Tang et al. invites such combination by teaching,

> An ideal solution to the foregoing limitation would be a low power emissive display that eliminates the need for backlighting. A particularly

> attractive candidate is thin-film-transistor-electroluminescent (TFT-EL) displays. In TFT-EL displays, the individual pixels can be addressed to emit light and auxiliary backlighting is not required.

Tang, col. 3 – 8. Tang adds,

> The particular properties of organic EL material that make it ideal for TFT are summarized as follows:
>
> 1) Low-voltage drive. Typically, the organic EL cell requires a voltage in the range of 4 to 10 volts depending on the light output level and the cell impedance. The voltage required to produce a brightness of about 20 fL is about 5 V. This low voltage is highly attractive for a TFT-EL panel, as the need for the high-voltage TFT is eliminated. Furthermore, the organic EL cell can be driven by DC or AC. As a result the driver circuitry is less complicated and less expensive.
>
> 2) High efficiency. The luminous efficiency of the organic EL cell is as high as 4 lumens per watt. The current density to drive the EL cell to produce a brightness of 20 fL is about 1 mA/cm.sup.2. Assuming a 100% duty excitation, the power needed to drive a 400 cm.sup.2 full-page panel is only about 2.0 watts. The power need will certainly meet the portability criteria of the flat panel display.
>
> 3) Low temperature fabrication. Organic EL devices can be fabricated at about room temperature. This is a significant advantage compared with inorganic emissive devices, which require high-temperature (>300.degree. C.) processing. The high-temperature processes required to make inorganic EL devices can be incompatible with the TFT.

Tang, col. 2, lines 39 – 64. Tang further adds,

> There are several important advantages in the actual panel construction and drive arrangement of a TFT-organic EL device of the present invention:
>
> 1) Since both the organic EL pad and the cathode are continuous layers, the pixel resolution is defined only by the feature size of the TFT and the associated display ITO pad and is independent of the organic component or the cathode of the EL cell.
>
> 2) The cathode is continuous and common to all pixels. It requires no patterning for pixel definition. The difficulty of patterning the cathode in the two-terminal scheme is therefore eliminated.

> 3) The number of scanning rows is no longer limited by the short row dwell time in a frame period, as the addressing and excitation signals are decoupled. Each scan row is operated at close to 100% duty factor. High resolution can be obtained since a large number of scan rows can be incorporated into a display panel while maintaining uniform intensity.
>
> 4) The reliability of the organic EL element is enhanced since it operates at a low current density (1 mA/cm.sup.2) and voltage (5 V) in a 100% duty factor.
>
> 5) The IR potential drops along the buses are insignificant because of the use of a common cathode and the low current density required to drive the EL elements. Therefore the panel uniformity is not significantly affected by the size of the panel.

Tang, col. 5, lines 15 – 43. Tang concludes,

> The TFT-EL panel of the present invention has two important advantages in terms of power requirements over TFT-LCD panels. First, the TFT-EL power need is relatively independent of whether the panel is monochrome or multi-color, provided that the color materials have a similar luminescent efficiency. In contrast, the TFT-LCD colored panel requires a much higher power than the monochrome panel because the transmission factor is greatly reduced in the colored panel by the color filter arrays. Second, the LCD backlight has to stay on regardless of the screen usage factor. In contrast, the TFT-EL power consumption is highly dependent on this usage factor. The average power consumption is much less since less than 100% of the EL screen is emitting at any given time in typical applications.

Tang, col. 11, line 66 – col. 12, line 12.

Claim 2

Claim 2 is dependant on claim 1. Tang et al. teaches an electroluminescence display that has, corresponding to each display pixel, a switching TFT 1 for controlling turning on and off of a driving TFT 2 and a current there through. Tang et al., col. 6, lines 9 – 20; and figure 1.

Claim 10

Claim 10 is dependant on claim 1. Tang et al. teaches that the self-emissive element is an electroluminescence element. Tang et al., col. 1, lines 16 – 19.

Claim 11

Claim 11 is dependant on claim 1 and adds that the size of the driving TFT is altered by changing a gate width according to emitting color while a gate length is fixed.

Neither Ukai nor Tang et al. specifically state that the size of the driving TFT is altered by changing a gate width according to emitting color while a gate length is fixed.

It would have been obvious to one of ordinary skill in the art at the time of the invention to alter the size of the driving TFT by changing a gate width according to emitting color while a gate length is fixed. Ukai invites such step.

> Such control of the ration W/L of the thin film transistor of each color can easily be effected by selecting the size of a mask which determines the ratio W/L, during the manufacture of the liquid crystal display element.

Ukai, col. 3, lines 46 – 50.

It would have been obvious to one of ordinary skill in the art at the time of the invention to control the ration W/L by fixing the gate length L while changing the gate width W.

Claim 12

Claim 12 is dependant on claim 1 and adds that the size of the driving TFT is altered by changing a gate length according to emitting color while a gate width is fixed. For the reasons discussed in the response to claim 11, it would have been obvious to one of ordinary skill in the art at the time of the invention to control the ration W/L by fixing the gate width W while changing the gate length L.

3. Claims 3 – 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ukai in view of Tang et al. as applied to claim 1 above, and further in view of Rumbaugh, USPN 6,072,272.

Claim 3

Claim 3 is dependant on claim 1 and adds that the size of the driving TFT is determined according to an emissive efficiency of a self-emissive element connected to the driving TFT. Ukai teaches varying the size of the driving TFT according to the different light transmission characteristics for each color. Ukai, col. 4, lines 47 – 54; col. 4 and lines 47 – 56.

Neither Ukai nor Tang et al. specifically teach that the different light transmission characteristics for each color is the emissive efficiency of each color self-emissive element.

Rumbaugh teaches display pixels configured to compensate for the emissive efficiency of each color self-emissive element. Rumbaugh, col. 3, lines 33 – 45; and col. 4, lines 39 – 55.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Rumbaugh with the teachings of Ukai and Tang et al. to produce a display wherein the size of the driving TFT is determined according to an emissive efficiency of a self-emissive element connected to the driving TFT. Rumbaugh teaches the need to adjust the each pixel according to the emission efficiency of peach self-emissive element.

> In forming subpixels to have a surface area and position determined by the light emission efficiency of the particular phosphor, the invention provides a display having improved color performance.

Rumbaugh, col. 3, lines 25 – 29. Rumbaugh adds,

> To further enhance color performance, the area ratios of the red, green, and blue subpixels can be adjusted depending upon the particular phosphor, and the desired white color coordinate. In particular, the blue subpixels arrayed on the anode of a display formed in accordance with the invention have a larger surface area than either the red subpixels or the green subpixels. Additionally, the red subpixels have a greater surface area on the anode than the green subpixels.

> Accordingly, anodes fabricated in accordance with the invention contain a plurality of subpixels, in which the surface area of each blue subpixel in greater than the surface area of each red subpixel, and the surface area of each red subpixel is greater than the surface area of each green subpixel.

Rumbaugh, col. 3, lines 33 - 49. Although Rumbaugh teaches an relationship between the size of the pixel area and the size of the emissive efficiency, the logic would equally apply to the size of the driving TFT and the emissive efficiency.

Claim 4

Claim 4 is dependant on claim 3. Rumbaugh teaches that emissive area of a pixel having a high emissive efficiency is set smaller compared to the emissive area of a pixel connected to a self-emissive element having a low emissive efficiency. Rumbaugh, col. 4, lines 51 – 55.

Claim 5

Claim 5 is dependant on claim 3. Rumbaugh teaches that emissive area of a pixel having a high emissive efficiency is set smaller compared to the emissive area of a pixel connected to a self-emissive element having a low emissive efficiency. Rumbaugh, col. 4, lines 51 – 55.

Claim 6

Claim 6 is dependant on claim 5. Rumbaugh teaches that green has the highest emission efficiency. Rumbaugh, col. 3, lines 4 – 6; and col. 4, lines 49 – 51.

Claim 7

Claim 7 is dependant on claim 3. Rumbaugh teaches that emissive area of a pixel having a lowest emissive efficiency is set larger compared to the emissive area of a pixel connected to a self-emissive element having a high emissive efficiency. Rumbaugh, col. 4, lines 51 – 55.

Claim 8

Claim 8 is dependant on claim 7. Rumbaugh teaches that blue has the lowest emission efficiency and red has a lower emission efficiency than green. Rumbaugh, col. 4, lines 51 – 55.

Claim 9

Claim 9 is dependant on claim 3. Rumbaugh teaches that emissive area of a pixel is made successively larger as the emissive efficiency decreases. Rumbaugh, col. 4, lines 51 – 55.

4. Claims 13 - 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ukai and Tang et al. in view of Rumbaugh as applied to claims 1 and 3 above, and further in view of Codama et al., USPN 6,121,726.

Claim 13

Claim 13 describes a color display device. Ukai, Tang et al., and Rumbaugh teach a color display device. As discussed in the rejection to claim 1, Ukai and Tang et al. teach a self-emissive element for emitting light of a predetermined color and a driving thin film transistor (TFT) connected to the self-emissive element for supplying a drive current to the self-emissive element. As discussed in the rejections to claim 1 and claim 3, Ukai and Tang et al. in view of Rumbaugh teaches that size of the driving TFT in a display pixel for one color is set for every color in accordance with the emission efficiency of the emissive element disposed at the display pixel.

Claim 13 adds that the that size of the driving TFT in a display pixel for one color is set for every color in accordance with the chromaticity of each color emitted by respective emissive element and the chromaticity of target display white of the display device. Rumbaugh teaches

"To further enhance color performance, the area ratios of the red, green, and blue subpixels can be adjusted depending upon the particular phosphor, and the desired white color coordinate." Rumbaugh, col. 4, line 57 – col.5, line 8.

Ukai, Tang et al., and Rumbaugh do not specifically teach the chromaticity of each color emitted by respective emissive element and the chromaticity of target display white of the display device.

Codama teaches the chromaticity of each color emitted by respective emissive element and the chromaticity of target display white of the display device. Codama, col. 3, lines 5 – 10.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use chromaticity as taught by Codama with the color adjusted display of Ukai, Tang et al., and Rumbaugh to produce a display with pixels adjust both for the emission efficiency of each emissive element and for the chromaticity of each color emitted by each emissive element and the chromaticity of target display white of the display device. Codama teaches,

> [I]t is preferable to regulate the respective layers in conformity to chromaticity coordinates according to the NTSC standard or the current CRT standard. Such chromaticity coordinates may be determined by use of general chromaticity coordinates measuring equipment, for instance, BM-7 or SR-1 made by Topcon Co., Ltd.

Codama, col. 3, lines 5 – 10. By regulating the pixels according to the chromaticity coordinates, the display would be most pleasant to the human eye.

Claim 14

Claim 14 is dependant on claim 13 and adds that the size of the driving TFT of the display pixel of any one color, among the display pixel of various colors, is different from the size of the driving TFT of the display pixel of another color. Rumbaugh teaches that the size of

emissive area of a pixel of any one color, among the display pixel of various colors, is different from the size emissive area of the display pixel of another color. Rumbaugh, col. 4, lines 51 – 55.

Claims 15 and 18

Claim 15 is dependant on claim 13 and claim 18 is dependant on claim 16. Codama teaches that the emissive element is an organic electroluminescence element comprising the emissive layer using an organic compound. Codama, col. 1, lines 10 – 14.

Claim 16

Claim 16 describes a color display device. As discussed in the rejection to claim 1, Ukai and Tang et al. teach a self-emissive element for emitting light of a predetermined color and a driving thin film transistor (TFT) connected to the self-emissive element for supplying a drive current to the self-emissive element. As discussed in the rejections to claim 1 and claim 3, Ukai and Tang et al. in view of Rumbaugh teaches that size of the driving TFT in a display pixel for one color is set for every color in accordance with the emission efficiency of the emissive element disposed at the display pixel.

As discussed in the rejections to claim 13 and 14, Ukai, Tang et al., and Rumbaugh, in view of Codama, teach that size of the driving TFT in a display pixel for red, for green, and for blue is set on the basis of the emission efficiency of the emissive element of each display pixel and a luminance ratio of red to green to blue in accordance with each chromaticity of red, green, and blue emitted by respective emissive element of the display pixel, and with the chromaticity of target display white of the display device.

Claim 17

Claim 17 is dependant on claim 16 and adds that the emissive area of the display pixel of any one color among the display pixel for red, for green, and for blue is different in size from the emissive area of the display pixel of another color. Rumbaugh teaches adds that the emissive area of the display pixel of any one color among the display pixel for red, for green, and for blue is different in size from the emissive area of the display pixel of another color. Rumbaugh, col. 4, lines 51 – 55.

Response to Arguments

5. Applicant's arguments filed 22 October 2003 have been fully considered but they are not persuasive.

Examiner rejected claims 1 – 18 as unpatentable either over Ukai in view of Tang et al. or over Ukai in view of Tang et al. combined with other prior art. In response, applicant argued 1) that neither Ukai nor Tang teach "a driving thin film transistor (TFT) connected to said self-emissive element for supplying a drive current to said self-emissive element; and 2) that it would not have been obvious to combine Ukai with Tang.

The first argument is easily dismissed. Tang specifically teaches, "The on-current requirement for TFT2 is (designed to be) about 2 times the EL pixel current, 1.6 μA. This factor of two allows for adequate drive current to compensate for the gradual degradation of the organic EL element with operation." Tang, col. 11, lines 35 – 39. Thus, it follows that TFT2, the driving TFT, provides the drive current for the EL pixel.

The second argument is more troubling. Ukai teaches a TFT for a pixel of a liquid crystal display. "In the liquid crystal display element a capacitor 31 by the display electrode 15 is connected, as a load capacitance, to the drain of the thin film transistor 16, as shown in FIG. 6." Ukai, col. 4, lines 14 – 17. Tang, however, teaches a driving TFT for a pixel for an electroluminescent element. Would it have been obvious to one of ordinary skill in the art at the time of the invention to combine the teaching of Ukai about the relationship between the size of a TFT and color of a filter as applied to a pixel for a liquid crystal display, with the TFT-EL display as taught by Tang? That is, would it have been obvious to apply a technique developed for a TFT for a pixel of a liquid crystal display to a TFT for a pixel for a electroluminescent display?

It has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, it well know in the art to apply the teaching about a TFT for driving a pixel of a liquid crystal display to a TFT for driving a pixel of an electroluminescent display. Much of the teachings that apply to the TFT for a liquid crystal display also apply to an electroluminescent display. See e.g. Sasaki et al., USPN 5,818,068, col. 14, lines 42 – 53, col. 21, lines 11 - 24; Yamazaki et al., USPN 5,888,858, col. 11, lines 21 – 25; Sano et al., USPN 6,252,248 B1, col. 8, lines 20 – 44; and Sano et al., USPN 6,628,363 B1, col. 10, lines 9 – 25. Thus, it would have been obvious in the art to combine Ukai with Tang even if Ukai teaches a technique for a TFT for a liquid crystal pixel while Tang teaches a TFT for an electroluminescent display pixel.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leland Jorgensen whose telephone number is 703-305-2650. The examiner can normally be reached on Monday through Friday, 7:00 a.m. through 3:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven J. Saras can be reached on 703-305-9720.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9306

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office, telephone number (703) 306-0377.

lrj

STEVEN SARAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600